SECOND REPORT

National Steering Committee for Application of Pesticides - Western Defoliators

April 17, 1990

USDA Forest Service
Washington Office/Forest Pest Management
2121 C 2nd Street
Davis, CA 95616
(916)758-4600
FTS 460-1715

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A. Operating Guidelines for National Steering Committee

B. Committee Member Reports

C. Guidelines for Design of Field Experiments and Pilot Projects

I. INTRODUCTION

The second meeting of the National Steering Committee for Aerial Application of Pesticides - Western Defoliators met in Albuquerque, New Mexico, October 11-12, 1989.

A. Committee Members

Roy Beckwith[2.]	PNW/FIDR (Corvallis, OR)
Jesus Cota	WO/FP (Washington, D.C.)
John Cunningham[1.]	Forest Pest Management Institute (Sault Ste. Marie, Ontario)
Gary Daterman[1.]	PNW/FIDR (Corvallis, OR)
Bob Ekblad[2.]	WO/ENGR/MTDC (Missoula, MT)
Kees van Frankenhuyzen[1.]	Forest Pest Management Institute (Sault Ste. Marie, Ontario)
Jim Hadfield[2.]	R-6(RO)FPM (Portland, OR)
Dennis Hamel[1.]	WO/FPM (Washington, D.C.)
Dave Leatherman[1.]	Colorado State Forest Service (Ft. Collins, CO)
Ladd Livingston	Idaho Department of Lands (Coeur D'Alene, ID)
John Neisess	R-5(RO)FPM (San Francisco, CA)
Max Ollieu	WO/FPM (Washington, D.C.)
Iral Ragenovich	R-6(RO)FPM (Portland, OR)
Pat Shea	PSW/FIDR (Davis, CA)
Larry Stipe	R-1(RO)TM (Missoula, MT)
Julie Weatherby	R-4(BFO)FPM (Boise, ID)
Jack Barry	WO/FPM Committee Chair (Davis, CA)

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1. Absent
2. Ad hoc participants

B. Purpose of Committee

The purpose of the committee is to analyze, identify, and recommend field and pilot testing needs for aerial application of pesticides. Needs include those associated with pesticides, application systems, techniques, and strategies that influence the FS's and State cooperator's ability to use pesticides safely, effectively, and in an economically, and environmentally acceptable manner.

C. Agenda

Introduction
Review of 1988 Committee Recommendations & Accomplishments
Individual Project Reports and Discussions
Guidelines
Bibliography
Recommendations
Conclusions

D. Operating Guidelines for National Steering Committees (See Appendix A)

E. Committee member reports (See Appendix B).

F. The current draft of guidelines for designing field experiments and pilot projects are enclosed (See Appendix C).

II. RECOMMENDATIONS

Recommendations are listed in order of priority followed by the organization that should initiate action.

A. Laboratory

1 1. **Pursue laboratory testing of new B.t. strains.**

wild continue

New strains of B.t. that may have significantly higher efficacy against western defoliators should be tested in the laboratory as they become available.

PNW

2 2. **Develop a plan to obtain data on impact of pesticides on non-target leptidoptera.**

Bt

There is need for data on the impact of pesticides on non-target leptidoptera. There is only limited information in this area and the committee recommends that a plan be developed by PSW/PNW to

obtain this data. The plan would include field inventory, laboratory evaluations, field testing, and methods to fund and accomplish this work.

PSW/PNW

3. **Develop, identify, and evaluate improved carriers for TM-Biocontrol.**

The molasses carrier for TM-Biocontrol is a difficult to mix and apply in the field. There is need to investigate carriers that have been used for other biologicals and/or to develop new carriers. The committee recommends that PNW pursue this and evaluate carriers that show promise in the laboratory.

PNW

4. **Explore techniques for rapid bio-assay of microbials.**

There is need to determine the potency of microbial tank mixes immediately before spray operations. Bruce Hammock, University of California (Davis) Entomology Department may have developed an enzyme link immunosorbant assay (ELISA) method of determining potency. Pat Shea volunteered to explore the status and applicability of this technique and report to the committee.

PSW

5. **Determine evaporation rates and physical properties of microbial tank mixes.**

Data on evaporation rates and physical properties are needed for operational use of new microbial tank mixes and for input to the AGDISP and FSCBG aerial spray models. WO-FPM (Davis) jointly should explore ways to obtain this information.

WO/FPM

6. **Obtain spread-factors for all microbial tank mixes.**

Spread factors are essential to quantify the deposition (drop size and volume deposited) of aerial sprays. Without representative spread factors we cannot compare formulations, improve atomization, or quantify the quality of application including spray drift. WO-FPM (Davis) should pursue this task.

WO/FPM

B. Field Tests

1. **Conduct field tests of new strains of Bacillus thuringiensis (B.t.) against western spruce budworm as recommended by PNW (Project 4502).**

The committee places a high priority on field testing microbials that have demonstrated significantly improved efficacy in the laboratory. We must be cautious, however, and have some level of confidence that the producer will be available to provide a registration and product for operational use.

PNW

2. **Conduct field tests of improved tank mixes of TM-Biocontrol.**

This is high priority and the committee recognizes that before field tests are conducted improved tank mixes will need to be developed.

PNW

3. **Conduct mating disruption tests using pheromones against ~~western spruce budworm and~~ Douglas-fir tussock moth (DFTM) outbreaks.**

Preliminary tests against western spruce budworm were done on a small scale in 1980. These tests showed promise. Tests are needed to evaluate mating disruption strategy on large size (1000A) blocks for western spruce budworm to minimize the confounding influence of mated females flying into treatment areas. DFTM mating disruption would be tested on a pilot scale but on smaller-sized plots (less than 500 acres are acceptable). The committee recognizes that qualifying populations of DFTM will be difficult to predict.

PNW

4. **Conduct field experiments of Sandoz Crop Protection Corporation (Sandoz) product SAN 415 SC 32LV (NRD-12 strain, 32 BIU per gallon) against DFTM to obtain efficacy data.**

SAN 415 is registered for spruce budworm and gypsy moth but not for DFTM in California. It is formulated identically to Thuricide 32LV except it contains the NRD-12 strain instead of the HD-1 strain. SAN 415 has not been adequately field tested Against the douglas-fir tussock moth; therefore, the committee recommends field testing of SAN 415 against This species when adequate populations are found. Sandoz prefers to provide SAN 415 for forestry over Thuricide 32LV and Thuricide 48LV, the former an NRD-12 strain, the latter two HD-1 strains. The main production product at the Sandoz, Wasco, CA facility is Javelin,

an NRD-12 strain, for the agriculture market. It would be relatively easy for Sandoz to produce SAN 415 as it contains the same strain as Javelin. Last year the committee discussed testing Javelin and decided against testing as it is not formulated nor registered for forestry. Testing of SAN 415 is consistent with the committee's operating guidelines of encouraging the private sector to develop and maintain forestry-use pesticides. The intent is to maintain more labels to encourage competition.

PNW

5. **Conduct field experiments of lower doses of TM-Biocontrol.**

Laboratory results suggest that lower dosages DFTM virus may be effective and this needs to be evaluated in the field to determine the lower effective threshold. The committee feels that emphasis should be placed upon reducing costs through reducing dosages.

PNW

6. **Conduct cooperative field tests of several dosages (0.5, 1, and 2 ounces per acre) of Dimilin against DFTM, ~~in California~~.**

There is need to identify the lower effective dose range of Dimilin (diflubenzuron) against DFTM for economic and environmental reasons. The need to conduct tests in California parallels the need discussed in paragraph 4 above.

PSW

C. Pilot Projects and Cooperative Field Tests/Pilot Projects

1. **Conduct cooperative pilot test of the Sandoz B.t. product SAN 415 against western spruce budworm.**

Recommendation is subject to review by the committee of NRD-12 strain performance data and to Sandoz' intent to market SAN 415 for forestry use. If data are supportive, the committee may recommend operational use in lieu of pilot testing.

PNW

2. **Conduct cooperative pilot test of TM-Biocontrol, double (spring and summer treatments) against new, low level, and sub-outbreaks of DFTM.**

There are data that suggests a double treatment strategy using TM-Biocontrol might control early emerging infestations of Douglas-fir tussock moth. Such a strategy has significant potential for major cost/benefits.

PNW

3. **Conduct pilot test of B.t. against new and low level outbreaks DFTM.**

The above comments (III,C,2) apply.

PNW

4. **Conduct pilot test of Dipel 8L and Dipel 8AF applied at 32 ounces per acre to control western spruce budworm.**

The committee suggests that Abbott Laboratory conduct a pilot test to evaluate on an operational scale effectiveness of Dipel 8L and Dipel 8AF applied at ultra low volumes of 32 ounces per acre. The FS would be a cooperator with Abbott Laboratory bearing the major expense.

Abbott Laboratories

D. Equipment, Models, and Technology Development

1. **Conduct airport spray trials to characterize Dipel 6AF.**

R-6 is considering operational use of Dipel 6AF, however, we lack information on field handling, atomization, spray deposition, and swath widths for the improved formulation. The committee recommends that WO-FPM (Davis), in cooperation with Abbott Laboratory and R-6, conduct spray trials at Davis, CA to characterize Dipel 6AF.

WO/FPM

2. **Evaluate and recommend methods of sampling ultra low volume (ULV) sprays on pilot and operational projects.**

Monitoring spray deposit is an essential element on spray projects. Monitoring assesses the on and off target deposition and helps to determine if an adequate amount of spray reached the target. ULV sprays, which are applied in small drops, are difficult to detect due to visibility and tendency to deposit on objects smaller than traditional samplers. An inexpensive, rapid, and easy to use method is needed for use on pilot and operational projects.

MTDC

3. **Evaluate existing aircraft guidance systems and provide recommendations for operational deployment.**

The FS has experienced field problems with the Pathlink aircraft guidance and tracking system. The committee recommends that there be no further use of Pathlink until an engineering evaluation is made to determine its capabilities and limitations, and its relationship to GPS and GIS; and that MTDC be requested

to do this work. WO-FPM will send a letter to Director, Engineering requesting an engineering evaluation of Pathlink and investigate if other systems exist.

MTDC

4. **Evaluate the utility of the computer model Computer Assisted Spray Productivity Routine (CASPR) on a pilot or operational project.**

   CASPR is a model that calculates the productivity of spray aircraft. Input variables include aircraft speed, turn times, load capacity, swath widths, etc. The model has potential to reduce application costs through more knowledge and better estimates during negotiated contracts, and selecting optimum types of aircraft for projects. The committee recommends that CASPR be evaluated to assess its precision on a pilot in planning an operational project with MTDC taking the lead.

   MTDC

5. **Update reference reports on atomization of current pesticide tank mixes.**

   WO-FPM (Davis) has sponsored numerous wind tunnel tests at University of California, Davis Campus, to characterize the number and size of drops that are atomized from a variety of nozzles. Variables included tank mix, flow rate, atomizer, atomizer orientation, and air speed. Atomization data are used to select the proper spray parameters to support effective treatment. Data are scattered in several reports and are needed for several new tank mixes. Such data should be gathered and bound in one or two references. Further, an inventory should be taken to identify those tank mixes which need to be checked for atomization. Concurrent with wind tunnel tests is the need to determine physical properties of the tank mix.

   WO/FPM

6. **Update and add spray nozzle specification data to the Program WIND aerial application equipment handbook.**

   This Program WIND publication is being used nationally by Federal and State agencies. The committee recommends that the reference be enhanced with the addition of spray nozzle specifications. MTDC should include this when the handbook is revised.

   MTDC

7. **Coordinate complex terrain modeling with Global Positioning System (GPS), GIS, and expert system activities being developed by the FS.**

WO-FPM (Davis) and MTDC are pursuing the identification and incorporation of a suitable complex terrain code in the FSCBG model. A meeting is scheduled at WO-FPM, MAG during December, 1989 to discuss coordination and cooperation. The committee encourages close coordination with the FPM Advanced Technology Task Force and WO-CS&T.

MTDC

8. **Determine physical properties and drag coefficients of substances.**

The FS has need to aerially apply solid forms of pesticides, pheromones, seeds, and fertilizers. To predict distribution of these substances it is important to know the drag coefficients and physical properties of the particles. As substances are being considered for field use, MTDC should be contacted for these physical measurements.

MTDC

E. Information Management

1. **Plan and conduct multi-year monitoring, analyses, and data management of spray treatments.**

Even short term benefits of treatment cannot be determined during the first year of treatment. For cost/benefit information and other economic analysis, the benefits or lack of benefits over 3 to 5 year periods should be established and recorded. This includes the R-6 Meacham Pilot Project conducted in 1988. Monitoring during 1989 shows that the benefits of treatment were carried over from 1988 to 1989. Monitoring the R-3 Jemez Mountain control project showed that the western spruce budworm was kept suppressed for 5 years. This is valuable information in developing control strategies and in calculating cost/benefits for future control operations.

WO/FPM

2. **Publish a reference and maintain a Data General computer data base on western defoliator aerial spray projects.**

Julie Weatherby has prepared an outline for collecting and indexing basic data on aerial spray projects. The committee recommends that data be collected from projects dating back to 1970, be indexed, and added to the FS's national data base, searchable by index number, and also that it be published. The committee will send a letter to Regions 1, 2, 3, 4, 5, 6, and 10 and PSW, PNW, INT, and RM requesting their cooperation in providing references and/or base data. The committee members volunteered to assist in this endeavor. WO-FPM (Davis) will take the lead with a draft report ready by August 1990.

WO/FPM

F. Administrative

1. **Committee Operating Guidelines.**

   a. Emphasize cooperation between FIDR and FPM especially in planning and conducting field projects.

   b. Continue to emphasize the need to field test new strains of B.t. and not the HD-1 strain. The HD-1 strain has been adequately tested by FIDR, however, unique or unusual changes to HD-1 or its carrier may qualify it for testing.

   c. Maintain the traditional approach to field testing and pilot projects.

   d. Maintain this Steering Committee.

   e. Encourage thorough and timely reporting of field tests and pilot project results.

   f. Facilitate cooperation with industry and encourage development and testing of microbials.

   g. Seek ways to reduce costs of field tests and pilot projects, and to encourage industry to share costs.

2. **Guidelines for Field Tests and Pilot Projects.**

   a. Drafts of the Field Test and Pilot Project guidelines have been submitted to WO and are available for review by State cooperators and industry. FIDR has not yet decided whether to incorporate the Field Test guidelines in the FS handbook. FPM will incorporate the latest version of the Pilot Project guidelines in the FS handbook when the handbook is ready for publication. Both guidelines will continue as drafts for the foreseeable future.

   b. Need for other guidelines was discussed and the committee suggests that guidelines be written for conduct of airport spray characterization trials.

3. **Environmental Impact Statement for DFTM.**

   The committee recommends that a west-wide programmatic EIS be prepared for DFTM management.

4. **NOVO's Foray 48B, Bacillus thuringiensis.**

   The committee encourages NOVO to pursue a pilot project of Foray 48B following recommended guidelines.

5. **Microbial research.**

The committee recommends maintaining and increasing support of microbial and pheromone research for improved pest monitoring and suppression research.

6. **Joint Meeting of Western and Gypsy Moth and Other Eastern Defoliators Steering Committees.**

The eastern committee has suggested that the two steering committees meet jointly and the committee concurs. It is proposed that the committees meet during October 1990 at a mutually agreed to city (eg., Atlanta, Seattle, Salt Lake City, Denver, St. Louis, Pittsburg, or Kansas City). The respective committees would meet concurrently followed by a joint one day session.

7. **B.t. products.**

Currently registered B.t. products for Douglas-fir tussock moth and western spruce budworm, and their respective undiluted application rates for 16 BIU's per acre are listed below.

Product	Application Rate	Registration DFTM[1]	WSBW[2]
Thuricide 32LV	64 oz	X	X
Thuricide 48LV	43 oz	X	X
SAN 415	64 oz	X[3]	X[3]
Dipel 6L	43 oz	X	X
Dipel 8L	32 oz	X	X
Dipel 6AF	43 oz	X[3]	X[3]
Dipel 8AF	32 oz	X[3]	X[3]
Foray 48B	43 oz	X[3]	X[3]

1. DFTM = Douglas-fir tussock moth.
2. WSBW = Western spruce budworm
3. Not registered for forestry use in California.

8. **Acephate (Orthene).**

The committee recommends that WO-FPM investigate opportunities to seek re-registration of acephate for control of forest defoliators.

III. ACCOMPLISHMENTS

Summarized below are accomplishments related to 1988 committee recommendations.

A. Laboratory and Field Experiment Testing

1. Ecogen, Condor, (HD-269) Bacillus thuringiensis (B.t.) was field tested.

2. New strains of B.t. were screened on an on-going basis.

B. Pilot Project Testing

Novo, Foray 48B (HD-1) B.t. was pilot tested.

C. Other

1. Incident Command Systems (ICS) system has been incorporated in current draft revision of FSH 2109.11, chapter 3.

2. WO-FPM in cooperation with FIDR has met with EPA concerning need to ease rules on registration of pheromones and issuance of experimental use permits.

3. There is increased cooperation and interacting among FIDR and FPM scientists.

4. Cooperative field projects were conducted by FIDR and FPM.

5. Traditional approach to field testing and pilot projects is being supported and maintained.

6. Steering committee is being maintained.

7. Guidelines for conduct of field tests and pilot projects have been drafted, reviewed, and submitted to Director, WO/FPM.

8. Preliminary procedure for accessing and summarizing a data-base of past spray projects has been developed.

9. Field training for use of aerial spray models has been accelerated with several hands-on workshops conducted and five other workshops scheduled over the next four months. FSCBG model was run in support of control projects in R-1, R-4, and R-5.

D. Reports

Project reports are enclosed in Appendix B.

IV. SUMMARY

The National Steering Committee for Aerial Application of Pesticides - Western Defoliators met in Albuquerque, October 11-12, 1989, to review events since the 1988 meeting, and to identify testing and related needs. The steering committee is evolving from its initial role of evaluating pilot project testing needs to that of identifying needs and recommending laboratory, developmental, field testing and pilot projects of pesticides, equipment, and strategies. The committee established operating guidelines at this meeting and prepared a listing of recommendations subdivided into six categories. The committee emphasizes that to address the needs and recommendations stated herein there is need for continued close cooperation among FPM, PNW, and PSW scientists; and for continuous of the PNW pesticide and microbial laboratories.

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